SWEEP

SOIL AND WATER

ENVIRONMENTAL

ENHANCEMENT PROGRAM

PAMPA

PROGRAMME D'AMELIORATION

DU MILIEU PEDOLOGIQUE

ET AQUATIQUE

Canada

Ontario

SWEEP

is a $30 million federal-provincial agreement, announced May 8, 1986, designed to improve soil and water quality in southwestern Ontario over the next five years.

PURPOSES

There are two interrelated purposes to the program; first, to reduce phosphorus loadings in the Lake Erie basin from cropland run-off; and second, to improve the productivity of southwestern Ontario agriculture by reducing or arresting soil erosion that contributes to water pollution.

BACKGROUND

The Canada-U.S. Great Lakes Water Quality Agreement called for phosphorus reductions in the Lake Erie basin of 2000 tonnes per year. SWEEP is part of the Canadian agreement, calling for reductions of 300 tonnes per year — 200 from croplands and 100 from industrial and municipal sources.

PAMPA

est une entente fédérale-provinciale de 30 millions de dollars, annoncée le 8 mai 1986, et destinée à améliorer la qualité du sol et de l'eau dans le Sud-ouest de l'Ontario.

SES BUTS

Les deux buts de PAMPA sont: en premier lieu de réduire de 200 tonnes par an d'ici 1990 le déversement dans le lac Erie de phosphore provenant des terres agricoles, et de maintenir ou d'accroître la productivité agricole du Sud-ouest de l'Ontario, en réduisant ou en empêchant l'érosion et la dégradation du sol.

SES GRANDES LIGNES

L'entente entre le Canada et les États-unis sur la qualité de l'eau des Grands Lacs prévoyait de réduire de 2 000 tonnes par an la pollution due au phosphore dans le bassin du lac Erie. PAMPA fait partie de cette entente qui réduira cette pollution de 300 tonnes par an — 200 tonnes provenant des terres agricoles et 100 tonnes provenant de sources industrielles et municipales.

VOLUME III

FIELD LEVEL ECONOMIC ANALYSIS OF CHANGING TILLAGE PRACTICES IN SOUTHWESTERN ONTARIO

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Agriculture Canada
for the
Soil and Water Environmental
Enhancement Program

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EXECUTIVE SUMMARY

This report contains the technical background data and analysis pertaining to the field level economic analysis of the Soil and Water Environmental Enhancement Program (SWEEP).

The analysis was conducted in two steps. The first step involved deriving a "representative" set of operations and inputs for each crop rotation and tillage method in each of the three pilot watersheds. The second step consisted of developing a partial budget to compare costs, net returns, and the opportunity cost of labour for each set of operations.

Results from this study indicate that soil conserving technologies are competitive, and in fact often generate higher net financial returns. The economic advantages of conservation tillage practices, especially no-till, are magnified when considering the opportunity cost of labour. While net returns between conservation and conventional tillage practices are comparable, labour requirements are much lower for conservation practices resulting in significantly higher returns per labour hour. Furthermore, based on yield estimates from several sources, the financial risk associated with soil conservation practices is similar to conventional tillage practices when comparing net returns per hectare, but are statistically lower when considering net returns per hour.

1.0 INTRODUCTION

This report contains the field level economic analysis of the Soil and Water Environmental Enhancement Program (SWEEP). The results of this report, along with the T-2000 report (Volume IV), are summarized in Section 3 of Volume I of this report series.

1.1 OBJECTIVES

The primary purpose of this report is to provide technical background information regarding the following questions:

- Does it pay to use reduced tillage practices when comparing results on a per hectare basis?
- What is the financial risk associated with alternative tillage practices?

The focus of this report is on the first question; assessing the financial costs and benefits of alternative tillage practices. The results of this study are incorporated into the aggregate watershed level analysis presented in Volume VI.

1.2 SCOPE

This study analyzes the field level economic benefits and costs associated with the introduction of soil conserving tillage technologies on three pilot demonstration watersheds in southwestern Ontario. This analysis addresses the impact of alternative tillage practices for selected crop rotations. Results are analyzed on a hectare basis and returns incorporate variable costs of production only.

Since the data collected from PDW watersheds was incomplete, it was necessary to construct "representative" field operations conducted under conventional and conservation tillage systems. These field operations were compiled from a variety of sources and are not intended to represent operations of any particular farm cooperator.

1.3 ORGANIZATION OF REPORT

This report is Volume III of a seven volume series, consisting of:

Volume I: An Economic Evaluation of Soil Tillage Technologies: Summary Report

Volume II: Collection and Analysis of Field Data From PDW

Volume III: Field Level Economic Analysis of Changing Tillage Practices in Southwestern Ontario

Volume IV: An Economic Evaluation of the Tillage 2000 Program in Ontario

Volume V: An Economic Assessment of the Technology Evaluation and Development (TED) Program

Volume VI: Watershed Level Economic Analysis of Tillage Practices in Southwestern Ontario

Volume VII: Macro-Economic Impact Assessment of Soil Conserving Technologies

This technical report is comprised of four major sections. The first section describes the data sources and the methodology used to analyze the impact of alternative tillage practices. Results of the field level analysis for each crop

rotation scenario are presented in Section 3.0. Problems and issues identified in the analysis are provided in Section 4.0, and Section 5.0 contains a summary of the findings.

This report also contains two appendices. Appendix A contains the partial budgets for each of the three watersheds while Appendix B contains the list and cost of operations and materials used to develop the partial budgets.

2.0 METHODOLOGY

The following summarizes the methodology used for the financial simulation of field level data to compare costs and net returns for alternative tillage practices. The financial simulations were conducted on a crop rotation basis for each of three watersheds: Kettle Creek, Pittock, and Essex. Details of the simulation results are also presented in this report.

The pilot watershed (study PWS) data contain field level information from a total of 60 producers from the three watersheds. Input and output data has been collected for three years (1989-91) on a field and cooperator basis. All of the data was entered into a data base management system (dBase III) with separate files for each watershed. Within each watershed file, the data was organized first by farm, then by field, and finally by crop-year (See Volume I for a detailed description of the data organization exercise). Each crop-year entry contained information on the crop grown, field operations, materials and machinery used, and associated yield.

The financial simulation analysis involved two steps:

1. Deriving a "representative" set of operations and inputs for each crop rotation and tillage method; and
2. Developing a partial budget to compare costs, net returns, and the opportunity cost of labour for each set of operations defined in step 1.

Each of these steps is detailed below.

2.1 THE TYPICAL SET OF OPERATIONS

The first step involved utilizing information from the PDW data to develop "typical" sets of farming operations for three types of tillage practices:

Conventional, Reduced, and No-till.[1] Unique sets of operations were constructed for various crop rotations under each of the three tillage practices in each of the three watersheds.

Each set of operations was designed to represent the "average" set of tillage practices and material usage for that particular crop rotation in that particular watershed. Since a wide variety of practices were observed in each watershed, the "average" was basically a modal rather than mean set of operations and does not necessarily represent any single producer. Not only do producers have individualized approaches to growing crops, but each field is unique and may require an individualized set of operations and inputs. For example, all corn fields do not suffer the same weed infestation or require the same fertilizer blend and rate.

Once the typical set of operations was defined, consultations were held with selected individuals involved in the extension programs for the PDW and T-2000 projects: Doug Aspinall of OMAF; Don Lobb, a farmer and PDW watershed technician; and Jane Sadler Richards, the coordinator of the field operations of the PDW project. Each was asked to verify our initial "average" profile of operations in each watershed. A revised set of operations was then developed based on their recommendations. Material inputs such as fertilizer and pesticides were included in the revised set of operations. Following a second consultation process, a final set of typical operations and material usage

[1] Tillage practices are generally differentiated by primary tillage practices and crop residue. Conventional tillage typically involves mouldboard ploughing, which completely overturns the soil leaving little crop residue. Conservation tillage methods only partially overturn the soil leaving a greater amount of crop residue. No-till involves no primary or secondary tillage, leaving the maximum amount of crop residue. Reduced tillage typically involves chisel plough primary tillage, but was defined as the "catch-all" category in this analysis, encompassing everything between the two extremes of Conventional and No-till.

for each tillage practice was defined for the following crop rotations[2] for each of the watersheds:

- corn following corn,
- corn following other crops,
- soybeans following corn, and
- wheat following soybeans.

Due to the absence of continuous corn rotations in the Essex watershed, representative sets of operations were only defined for the final three crop rotations in this watershed, resulting in a total of eleven financial simulation scenarios across all three watersheds. The representative set of operations for each rotation by watershed are presented in Tables 2.1 to 2.3.

2.2 PARTIAL BUDGETS

Once the eleven cropping scenarios had been developed, a financial model (partial budget) was generated for each scenario in order to determine the net economic impacts associated with alternative tillage practices. The eleven partial budgets for each crop rotation in each watershed are included in Appendix A, organized by watershed (Kettle Creek, Pittock, and Essex). The partial budgets are based on the following key variables:

Cost of Conducting Operations

- Field preparation - costs occurring before planting.
- Planting - costs involved in seeding operations.
- Growing - costs occurring after planting but before harvesting.
- Harvesting - costs involved in harvesting operations.

[2] Sufficient data for a meaningful comparison was not available for all crops.

Table 2.1 Operations for Various Rotations for Kettle Creek Watershed

ROTATION	TILLAGE METHOD					
	CONVENTIONAL		REDUCED		NO-TILL	
Corn after corn	Fall:	Moldboard plow	Fall:	Chisel plow	Fall:	
	Spring:	2 Cultivations	Spring:	2 Cultivations	Spring:	Spray
		Plant		Plant		No-till planter
		Spray		Spray		Spray
		Fertilize		Fertilize		Fertilize
		Row cultivate		Row cultivate		Combine
		Combine		Combine		
Corn after other	Fall:	Moldboard plow	Fall:	Chisel plow	Fall:	
	Spring:	Cultivate	Spring:	Cultivate	Spring:	Spray
		Incorporate spray		Incorporate spray		No-till planter
		Plant		Plant		Spray
		Spray		Spray		Fertilize
		Fertilize		Fertilize		Combine
		Row cultivate		Row cultivate		
		Combine		Combine		
Soy after corn	Fall:	Moldboard plow	Fall:	Chisel plow	Fall:	
	Spring:	Cultivate	Spring:	Cultivate	Spring:	Spray
		Incorporate spray		Incorporate spray		No-till planter
		Plant		Plant		Spray
		Spray		Spray		Combine
		Row cultivate		Row cultivate		
		Combine		Combine		
Wheat after soy	Fall:	2 Cultivations	Fall:	Cultivate	Fall:	No-till drill
		Plant		Plant		
	Spring:	Fertilize w/ clover	Spring:	Fertilize w/ clover	Spring:	Fertilize w/ clover
		Combine		Combine		Combine

Table 2.2 Operations for Various Rotations for Pittock Watershed

ROTATION	TILLAGE METHOD					
	CONVENTIONAL		REDUCED		NO–TILL	
Corn after corn	Fall:	Moldboard plow	Fall:		Fall:	
	Spring:	Cultivate	Spring:	Cultivate	Spring:	Spray
		Spray/Fertilize		Spray/Fertilize		No–till planter
		Cultivate		Cultivate		Spray
		Plant		Plant		Fertilize
		Spray		Spray		Combine
		Combine		Combine		
Corn after other	Fall:	Moldboard plow	Fall:		Fall:	
	Spring:	Cultivate	Spring:	Cultivate	Spring:	Spray
		Spray/Fertilize		Spray/Fertilize		No–till planter
		Cultivate		Cultivate		Spray
		Plant		Plant		Fertilize
		Spray		Spray		Combine
		Row cultivate		Row cultivate		
		Combine		Combine		
Soy after corn	Fall:	Moldboard plow	Fall:		Fall:	
	Spring:	Disc	Spring:	Disc	Spring:	Spray
		Cultivate		Cultivate		Spray
		Incorporate spray		Incorporate spray		No–till planter
		Plant		Plant		Spray
		Spray		Spray		Combine
		Row cultivate		Row cultivate		
		Combine		Combine		
Wheat after soy	Fall:	Moldboard plow	Fall:	Chisel plow	Fall:	No–till drill
		Cultivate		Cultivate		
		Plant		Plant		
	Spring:	Fertilize w/ clover	Spring:	Fertilize w/ clover	Spring:	Fertilize w/ clover
		Combine		Combine		Combine

Table 2.3 Operations for Various Rotations for Essex Watershed

ROTATION	TILLAGE METHOD					
	CONVENTIONAL		REDUCED		NO-TILL	
Corn after other	Fall:	Moldboard plow	Fall:	Disc	Fall:	
	Spring:	Cultivate	Spring:	Cultivate	Spring:	Spray
		Incorporate spray		Incorporate spray		No-till planter
		Plant		Plant		Spray
		Fertilize		Fertilize		Fertilize
		Row cultivate		Row cultivate		Combine
		Combine		Combine		
Soy after other	Fall:	Moldboard plow	Fall:	Chisel plow	Fall:	Spray
	Spring:	Disc	Spring:	Cultivate	Spring:	Spray
		Cultivate		Incorporate spray		No-till planter
		Incorporate spray		Plant		Spray
		Plant		Spray		Combine
		Spray		Row cultivate		
		Row cultivate		Combine		
		Combine				
Wheat after soy	Fall:	Disc	Fall:	Fertilize	Fall:	Fertilize
		Fertilize		Cultivate		No-till drill
		Cultivate		Plant		
		Plant				
	Spring:	Fertilize w/ clover	Spring:	Fertilize w/ clover	Spring:	Fertilize w/ clover
		Combine		Combine		Combine

Material Costs

- Seed - cost of seed planted.
- Fertilizer - cost of all fertilizer used.
- Herbicide - cost of all herbicide used.
- Insecticide - cost of insecticide used.

Other Variables

- Yield - tonnes per hectare of each harvested crop.
- Crop price - an average farm price per metric tonne of commodity.
- Total hours - hours required to complete all farming operations.

Each of these key variables is detailed below.

2.2.1 Cost of Conducting Operations

It is important for the purposes of this study to have a standardized comparison between the different tillage practices. In other words, in order to accurately assess the relative financial merits of each system, costs that arise due to personal farm attributes, such as equipment, must be neutralized.

According to Weersink *et al* (b), comparisons of alternative tillage systems using actual farm records may not be appropriate for a standardized comparison. This occurs because each producers' machinery complement results in actual farm costs that do not likely represent the minimum levels possible. Difficulties also arise in comparing costs between operations when the machinery differs in age.

To avoid these difficulties and to facilitate a standardized comparison, average custom farmwork rates charged in Ontario were used as proxies for actual

costs of conducting operations.[3] Although it is not realistic to assume that all field operations are custom-hired, it is reasonable to assume that custom rates represent the economic cost of conducting the field operations (ie. custom operators will charge a rate high enough to compensate for their time and costs but not so high as to make it cheaper for producers to buy their own equipment). It also permits a standard comparison between the various tillage practices by eliminating the problem of accounting for differences in age, size, and type of equipment.

The OMAF custom rates were differentiated by region. Region 1 rates were used for Kettle Creek and Essex watersheds and Region 2 rates for Pittock (or Region 3 rates where necessary). Custom rates were converted from a per acre basis to a per hectare basis for reporting purposes. Originally the intention was to separate fuel and labour costs from other operational costs, but these costs are implicitly incorporated in the custom rates. Applying these rates to the "typical" list of operations for each crop rotation (see Tables 2.1-2.3) provided a cost per hectare of conducting operations for each of the three tillage systems.

The set of operations and material inputs along with associated costs per hectare for each crop rotation in each watershed are presented in Appendix B. The set of operations and associated costs per hectare are presented in the top half of Tables B-1 through B-11, and the material inputs and affiliated costs per hectare associated with each set of operations are presented in the lower half of the tables.

[3] The costs per hectare are 1991 average custom farmwork rates charged in Ontario from OMAF, Economics Information, Report No:92-06, ISSN 0708-482X.

2.2.2 Material Costs

Unit costs were obtained from a variety of public sources and private price lists. As mentioned above, the type and rates of materials used are obtained from the PDW data. Even greater diversity exists in this category than for the type of operations conducted. For example, herbicide selection and application rates will depend on the particular weed problem of a given field. Similarly, the fertilizer blend and application rate is dependent on the soil test and nutrient requirement of each particular field. Therefore the "typical" set of materials used in each scenario was determined from the mode of the observations where possible or else from a reasonable amalgamation of the data, with particular attention to maintaining consistency between tillage systems. As mentioned above, material input costs are presented in the lower portion of Tables B-1 to B-11 in Appendix B.

2.2.3 Yield

For the corn and soybean rotation scenarios, three revenue calculations were conducted based on the yield estimates for the alternative tillage practices from three separate sources: 1) T-2000; 2) Weersink *et al* (a); and 3) OMAF.[4] For wheat, only two revenue scenarios were calculated (using the T-2000 and OMAF yields) since Weersink et al (a) did not include wheat in their analysis. Crop yields for the alternative tillage practices for each of the above sources are presented in Table 2.4.

[4] OMAF, *Agricultural Statistics for Ontario*, 1986-90.

Table 2.4 Crop Yields for Each Watershed & Tillage Practice (t/ha)

SOURCE		CORN			SOYBEANS			WHEAT		
		Conv.	Red.	No-till	Conv.	Red.	No-till	Conv.	Red.	No-till
T-2000	Kettle	8.28	7.93	8.01	2.70	2.50	2.23	3.88	4.03	3.68
	Pittock	8.36	8.02	8.09	2.84	2.63	2.34	4.08	4.22	3.86
	Essex	8.16	7.82	7.89	2.69	2.49	2.22	3.87	4.01	3.67
Weer-sink	Kettle	9.71	9.20	9.57	2.67	2.78	2.64	DATA NOT AVAILABLE		
	Pittock	9.81	9.29	9.66	2.81	2.92	2.77			
	Essex	9.56	9.06	9.43	2.66	2.77	2.63			
OMAF	Kettle	7.07	7.07	7.07	2.44	2.44	2.44	3.82	3.82	3.82
	Pittock	7.14	7.14	7.14	2.57	2.57	2.57	4.01	4.01	4.01
	Essex	6.97	6.97	6.97	2.43	2.43	2.43	3.81	3.81	3.81

The T-2000 and Weersink yield estimates were adjusted by a yield adjustment coefficient for each watershed to reflect the differences in average yields between the various counties. The yield adjustment coefficient was calculated by taking the ratio of the five year average county yield to the five year provincial average.

While yield estimates from T-2000 and Weersink *et al* (a) were generally highest for conventional tillage, they suggest that as farmers become more familiar with reduced tillage and no-till systems, yields may not be significantly different from those achieved under conventional systems. Hence, the revenue calculations based on OMAF yield data were assumed to be the same for each tillage method.

The results from the T-2000 yield estimates are used in the "Watershed Level Economic Analysis of Alternative Tillage Practices in Southwestern Ontario" due to the compatibility of this study with the T-2000 study.

2.2.4 Other Variables

Total (gross) revenue was calculated in the partial budgets by multiplying crop yield by commodity price. The crop prices used are the 1989-1991 average from OMAF.[5] An operating margin and net revenue were calculated by subtracting material costs and total costs respectively from each of the total revenue calculations. Finally, the opportunity cost of labour for each tillage system and each revenue scenario was estimated by dividing the net return per hectare by the total hours per hectare. The opportunity cost of labour, which can also be interpreted as a net return to labour, is an important source of information in evaluating whether to farm more land or devote more time to other activities in addition to making labour related decisions. The total hours per hectare were also obtained from the T-2000 study due to lack of reliable information in the PDW data.

[5] OMAF, *Agricultural Statistics for Ontario, 1990.*

3.0 RESULTS OF FIELD LEVEL ANALYSIS

The partial budgets for each crop rotation are presented for each watershed in Appendix A. This section will summarize the partial budget results by crop rotation, highlighting in particular the net revenues (per hectare and per hour of labour) for the different tillage systems.

3.1 CORN FOLLOWING CORN

In both Pittock and Kettle Creek[8], total costs per hectare were highest under conventional tillage (approximately $540/ha) and lowest for no-till practices (approximately $505/ha). While material costs were higher under no-till, due to higher herbicide costs, the costs of conducting operations were consistently higher for conventional systems, due primarily to higher field preparation costs. Reduced tillage had the same material costs as Conventional but had lower field preparation costs, resulting in a total cost per hectare between Conventional and No-till.

The yield adjustment coefficient was slightly higher for Pittock resulting in slightly higher revenue estimates than Kettle since crop price was assumed to be the same in each watershed. Of the three yield data sources, Weersink et al (a) provided the highest yield estimates, and OMAF the lowest. Results from the T-2000 study and the Weersink data both suggest that yields are highest under conventional tillage practices and lowest under reduced tillage; no-till yield estimates were between the other two.

While operating margin (total revenue minus material costs) was consistently the highest under conventional tillage, net revenue per hectare (total revenue minus total cost) was consistently the highest under no-till, with conventional generally second highest and reduced tillage lowest (see Table 3.1).

[8] Essex watershed did not contain a corn following corn scenario.

Table 3.1 Net Revenue (per hectare & per hour) for Corn Following Corn

		KETTLE			PITTOCK		
		Conv.	Red.	No-Till	Conv.	Red.	No-Till
Net Revenue ($/ha)	T-2000	365	335	369	366	366	375
	Weersink	520	473	539	523	505	546
	OMAF	233	240	266	232	270	271
NR/Hour ($/hr)	T-2000	109	128	194	109	140	197
	Weersink	155	180	284	156	193	287
	OMAF	69	92	140	69	103	143

Conv. = Conventional Tillage
Red. = Reduced Tillage

In both Kettle Creek and Pittock watersheds, the opportunity cost of labour (net revenue per hectare divided by hours per hectare) was clearly highest for no-till practices, with estimates ranging from approximately $140/hour to $285/hour. Unlike the net revenue estimates, reduced tillage was second highest ($90/hr - $180/hr) and conventional tillage was lowest ($70/hr - $155/hr) (see Table 3.1).

Therefore, for both Kettle Creek and Pittock watersheds, there seems to be a natural incentive to switch from conventional to conservation tillage practices when comparing net returns to labour. Net returns per hectare provide further incentive to switch to no-till, although conventional practices in general provide higher net returns than reduced tillage practices.

3.2 CORN FOLLOWING OTHER

Corn following "other" encompasses crop rotations of corn following crops other than corn. As with corn following corn, total costs per hectare were highest in all three watersheds for conventional tillage practices due primarily to higher field preparation costs. Material costs were quite similar for all three methods. Reduced tillage practices resulted in costs about $10-$40 less per hectare than conventional practices and no-till systems about $50-$70/ha less than conventional.

The same yield data as corn following corn was used in this set of partial budgets, with Pittock having the highest yield adjustment coefficient, and hence the highest gross revenue estimates, and Essex the lowest.

Operating margins were usually higher under conventional tillage followed by no-till and reduced tillage. Nevertheless, net returns per hectare were always greatest for no-till. Likewise, the opportunity cost of labour was by far the greatest for no-till (estimates ranged from $165 - $315/hr), followed by reduced tillage ($100 - $200/hr) and conventional tillage ($70 - $165/hr) (see Table 3.2).

Table 3.2 Net Revenue (per hectare & per hour) for Corn Following Other

		KETTLE			PITTOCK			ESSEX		
		Conv.	Red.	N-T	Conv.	Red.	N-T	Conv.	Red.	N-T
Net Revenue ($/ha)	T-2000	380	350	427	395	395	418	394	374	428
	Weersink	535	488	596	552	534	589	547	509	595
	OMAF	248	256	324	261	299	314	264	281	327
NR/Hour ($/hr)	T-2000	113	134	225	117	151	220	117	143	225
	Weersink	159	186	314	164	204	310	163	194	313
	OMAF	74	98	171	78	114	165	79	107	172

N-T = no-till

3.3 SOYBEANS FOLLOWING CORN (OR OTHER)

For Pittock and Kettle Creek, this category consists predominately of soybeans following corn; for Essex, this category includes a wider variety of soy rotations. As with the corn rotations, the cost of conducting operations was highest for conventional practices and lowest for no-till practices. Conventional practices resulted in higher field preparation as well as growing (row cultivation) costs. On the other hand, material (herbicide) costs were higher for no-till than the other two tillage systems. The resulting total costs per hectare in all watersheds were highest for conventional and lowest for no-till.

Both the T-2000 and Weersink studies displayed lower yields for soybeans under no-till than conventional or reduced tillage methods (with conventional highest in T-2000 and reduced highest in Weersink). Again, soybean prices were assumed constant across the watersheds so total revenue was dependent on yield estimates.

Using T-2000 data, both operating margins and net returns per hectare were highest under the conventional tillage system, with no-till the lowest. The opportunity cost of labour was approximately equal for all three tillage systems in each watershed with T-2000 yield estimates (see Table 3.3).

Using the yield data from Weersink et al (a), operating margins were highest under reduced tillage practices. Net revenues were also higher for reduced tillage than other methods in Essex and Pittock watersheds; no-till was highest in Kettle Creek. No-till resulted in the highest opportunity cost of labour in all three watersheds in this case.

Finally, using OMAF yield estimates and assuming equal yields for all three tillage systems resulted in no-till achieving the highest net returns per hectare and net returns per labour hour.

Table 3.3 Net Revenue (per hectare & per hour) for Soy Following Corn (or Other)

		KETTLE			PITTOCK			ESSEX		
		Conv.	Red.	N-T	Conv.	Red.	N-T	Conv.	Red.	N-T
Net Revenue ($/ha)	T-2000	242	203	187	214	205	142	187	172	124
	Weersink	235	268	282	207	273	242	180	237	219
	OMAF	182	190	236	152	192	195	127	158	173
NR/Hour ($/hr)	T-2000	81	72	92	72	73	70	63	61	61
	Weersink	79	95	~~39~~	69	97	119	60	84	108
	OMAF	61	67	116	51	68	96	43	56	85

3.4 WHEAT FOLLOWING SOYBEANS

As with the other rotations, the cost of conducting operations and total costs were highest for conventional and lowest for no-till in all three watersheds. Material costs were the same for all three systems since it was assumed that the same amount of seed and fertilizer were used.

There were only two revenue calculations done for this rotation, based on yield estimates from T-2000 and OMAF. Again, the T-2000 yields were adjusted to reflect county differences, with Pittock having the highest adjustment coefficient and Essex the lowest. The reduced tillage system resulted in the highest yield estimate in the T-2000 study, followed by conventional and no-till respectively. Total revenue and operating margins followed the same pattern, and net revenue per hectare was also highest for reduced tillage in all three watersheds using T-2000 yield estimates. However, the net returns per labour hour followed the familiar pattern of no-till highest, reduced tillage second, and conventional last (see Table 3.4).

Table 3.4 Net Revenue (per hectare & per hour) for Wheat Following Soy

		KETTLE			PITTOCK			ESSEX		
		Conv.	Red.	N-T	Conv.	Red.	N-T	Conv.	Red.	N-T
Net Revenue ($/ha)	T-2000	241	280	237	250	273	266	181	223	179
	OMAF	232	253	255	241	245	285	173	196	198
NR/Hour ($/hr)	T-2000	85	118	145	89	115	163	64	94	110
	OMAF	82	107	156	86	103	175	61	83	121

The opportunity cost of labour followed suit under OMAF yield estimates, but net revenue calculations revealed that no-till was slightly more profitable than reduced tillage in each watershed if yields were the same.

4.0 PROBLEMS/ISSUES

The following problems and issues were identified in the analysis of the field level data and should be kept in mind when interpreting the results:

- Participating farmers generally did not have side-by-side comparisons of conventional and conservation tillage, consequently, comparison of results contains numerous sources of variability.

- The tillage practices were not necessarily conducted consistently for all three years on the same plot, adding further to variability in results.

- At the end of the three years, farmers were still progressing up the learning curve and becoming more familiar with conservation techniques. Therefore the first year's data was not very indicative of the true potential of conservation technology. Furthermore, there was a drought in the second year resulting in unreliable data for that year, in some areas.

- Monitoring and collection of the field level data was often neglected resulting in a low level of confidence in the raw data, for which Deloitte & Touche had no control.

- Although there is a great deal of variability in the data, it is not accounted for in this analysis. Earlier attempts to incorporate this measure of risk failed due to the aforementioned raw data problems.

- The transition cost of switching tillage systems is ignored.

- The sets of operations for each crop rotation and material inputs were based on qualitative estimates of selected individuals. The results should therefore be interpreted with caution as it is quite possible for different conclusions to be drawn from a different set of original assumptions.

5.0 SUMMARY

In general, indications are that a conservation - especially a no-till - tillage system would be the economical choice for farmers in all three watersheds *given the assumptions made in this analysis and considering field level operations*. The evidence is especially convincing for corn and wheat rotations. Although no significant differences in results were noticed between watersheds, Weersink et al (a) concluded that conservation tillage systems appeared to be more competitive in sandy soils.

Comparing net returns across tillage methods for the various yield sources (T-2000, Weersink, and OMAF), provides an indirect measure of risk. This comparison reveals that conservation and conventional tillage practices have similar risk profiles. Given superior quality raw data in this study, a more appropriate analysis incorporating risk directly could have been accomplished.

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APPENDIX A

PARTIAL BUDGETS

Kettle Creek

SWEEP – Soil & Water Environmental Enhancement Program

KETTLE CREEK – Corn following Corn

Comparison of Average Production Costs and Net Returns for Alternative Tillage Practices

Custom farmwork rates charged in Ontario (OMAF ISSN 0708–482X)	Conventional ($/hectare)	Reduced ($/hectare)	No–Till ($/hectare)
Cost of Conducting Operations:[1]			
Field Preparation	81.57	73.69	15.44
Planting	26.46	26.46	42.43
Growing	54.19	54.19	37.07
Harvesting	74.67	74.67	74.67
Subtotal	236.89	229.01	169.61
Material Costs (MA):[2]			
Seed	76.80	76.80	76.80
Fertilizer	143.40	143.40	143.40
Herbicide	39.40	39.40	72.76
Insecticide	41.40	41.40	41.40
Subtotal (MA)	301.00	301.00	334.36
TOTAL COST (TC)	537.89	530.01	503.97
Revenue (T–2000):			
Yield (t/ha) (from T–2000)[3] yield adj coef = 1.081	8.28	7.93	8.01
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	902.57	864.86	873.11
Margin:			
Operating Margin (TR – MA)	601.57	563.86	538.75
Net Revenue (TR – TC)	364.68	334.85	369.14
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	108.53	127.81	194.29
Revenue (Weersink):			
Yield (t/ha) (Weersink et al)[6] yld adj coef = 1.081	9.71	9.20	9.57
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	1058.10	1002.72	1042.79
Margin:			
Operating Margin (TR – MA)	757.10	701.72	708.43
Net Revenue (TR – TC)	520.21	472.71	538.82
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	154.82	180.42	283.59
Revenue (OMAF):			
Yield (t/ha) (from OMAF)[7]	7.07	7.07	7.07
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	770.41	770.41	770.41
Margin:			
Operating Margin (TR – MA)	469.41	469.41	436.05
Net Revenue (TR – TC)	232.52	240.40	266.44
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	69.20	91.76	140.23

SWEEP – Soil & Water Environmental Enhancement Program

KETTLE CREEK – Corn following Other

Comparison of Average Production Costs and Net Returns for Alternative Tillage Practices

Custom farmwork rates charged in Ontario (OMAF ISSN 0708–482X)	Conventional ($/hectare)	Reduced ($/hectare)	No–Till ($/hectare)
Cost of Conducting Operations:[1]			
Field Preparation	85.87	77.98	15.44
Planting	26.46	26.46	42.43
Growing	54.19	54.19	37.07
Harvesting	74.67	74.67	74.67
Subtotal	241.19	233.31	169.61
Material Costs (MA):[2]			
Seed	76.80	76.80	76.80
Fertilizer	143.38	143.38	143.38
Herbicide	61.41	61.41	56.63
Insecticide	0.00	0.00	0.00
Subtotal (MA)	281.59	281.59	276.81
TOTAL COST (TC)	522.78	514.90	446.42
Revenue (T–2000):			
Yield (t/ha) (from T–2000)[3] yield adj coef = 1.081	8.28	7.93	8.01
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	902.57	864.86	873.11
Margin:			
Operating Margin (TR – MA)	620.98	583.27	596.30
Net Revenue (TR – TC)	379.79	349.96	426.69
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	113.03	133.57	224.58
Revenue (Weersink):			
Yield (t/ha) (Weersink et al)[6] yld adj coef = 1.081	9.71	9.20	9.57
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	1058.10	1002.72	1042.79
Margin:			
Operating Margin (TR – MA)	776.51	721.13	765.98
Net Revenue (TR – TC)	535.32	487.82	596.37
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	159.32	186.19	313.88
Revenue (OMAF):			
Yield (t/ha) (from OMAF)[7]	7.07	7.07	7.07
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	770.41	770.41	770.41
Margin:			
Operating Margin (TR – MA)	488.82	488.82	493.60
Net Revenue (TR – TC)	247.63	255.51	323.99
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	73.70	97.52	170.52

SWEEP – Soil & Water Environmental Enhancement Program

KETTLE CREEK – Soybeans following Corn

Comparison of Average Production Costs and Net Returns for Alternative Tillage Practices

Custom farmwork rates charged in Ontario (OMAF ISSN 0708-482X)	Conventional ($/hectare)	Reduced ($/hectare)	No-Till ($/hectare)
Cost of Conducting Operations:[1]			
Field Preparation	85.87	77.98	15.44
Planting	24.93	24.93	41.64
Growing	32.57	32.57	15.44
Harvesting	71.58	71.58	71.58
Subtotal	214.95	207.07	144.11
Material Costs (MA):[2]			
Seed	64.51	64.51	64.51
Fertilizer	0	0	0
Herbicide	102.73	102.73	119.44
Insecticide	0	0	0
Subtotal (MA)	167.24	167.24	183.95
TOTAL COST (TC)	382.19	374.31	328.06
Revenue (T-2000):			
Yield (t/ha) (from T-2000)[3] yield adj coef = 1.003	2.70	2.50	2.23
Crop Price ($/t)[4]	231.33	231.33	231.33
TOTAL REVENUE (TR)	624.14	577.74	515.09
Margin:			
Operating Margin (TR – MA)	456.90	410.50	331.14
Net Revenue (TR – TC)	241.95	203.43	187.03
Total Hours (per hectare)[5]	2.99	2.82	2.03
Opportunity Cost of Labour ((TR-TC)/Hours = $/hour)	80.92	72.14	92.14
Revenue (Weersink):			
Yield (t/ha) (Weersink et al)[6] yld adj coef = 1.003	2.67	2.78	2.64
Crop Price ($/t)[4]	231.33	231.33	231.33
TOTAL REVENUE (TR)	617.18	642.71	610.22
Margin:			
Operating Margin (TR – MA)	449.94	475.47	426.27
Net Revenue (TR – TC)	234.99	268.40	282.16
Total Hours (per hectare)[5]	2.99	2.82	2.03
Opportunity Cost of Labour ((TR-TC)/Hours = $/hour)	78.59	95.18	139.00
Revenue (OMAF):			
Yield (t/ha) (from OMAF)[7]	2.44	2.44	2.44
Crop Price ($/t)[4]	231.33	231.33	231.33
TOTAL REVENUE (TR)	564.45	564.45	564.45
Margin:			
Operating Margin (TR – MA)	397.21	397.21	380.50
Net Revenue (TR – TC)	182.25	190.14	236.39
Total Hours (per hectare)[5]	2.99	2.82	2.03
Opportunity Cost of Labour ((TR-TC)/Hours = $/hour)	60.95	67.42	116.45

SWEEP – Soil & Water Environmental Enhancement Program

KETTLE CREEK – Wheat following Soybeans

Comparison of Average Production Costs and Net Returns for Alternative Tillage Practices

Custom farmwork rates charged in Ontario (OMAF ISSN 0708–482X)	Conventional ($/hectare)	Reduced ($/hectare)	No–Till ($/hectare)
Cost of Conducting Operations:[1]			
Field Preparation	41.36	20.68	0.00
Planting	22.73	22.73	41.71
Growing	11.93	11.93	11.93
Harvesting	67.53	67.53	67.53
Subtotal	143.57	122.88	121.18
Material Costs (MA):[2]			
Seed	61.99	61.99	61.99
Fertilizer	64.96	64.96	64.96
Herbicide	0	0	0
Insecticide	0	0	0
Subtotal (MA)	126.95	126.95	126.95
TOTAL COST (TC)	270.52	249.83	248.13
Revenue (T–2000):			
Yield (t/ha) (from T–2000)[3] yield adj coef = 1.014	3.88	4.03	3.68
Crop Price ($/t)[4]	131.67	131.67	131.67
TOTAL REVENUE (TR)	511.36	530.05	484.65
Margin:			
Operating Margin (TR – MA)	384.41	403.10	357.70
Net Revenue (TR – TC)	240.84	280.22	236.53
Total Hours (per hectare)[5]	2.82	2.37	1.63
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	85.40	118.23	145.11
Revenue (OMAF):			
Yield (t/ha) (from OMAF)[7]	3.82	3.82	3.82
Crop Price ($/t)[4]	131.67	131.67	131.67
TOTAL REVENUE (TR)	502.98	502.98	502.98
Margin:			
Operating Margin (TR – MA)	376.03	376.03	376.03
Net Revenue (TR – TC)	232.46	253.15	254.85
Total Hours (per hectare)[5]	2.82	2.37	1.63
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	82.43	106.81	156.35

Pittock

SWEEP – Soil & Water Environmental Enhancement Program

PITTOCK – Corn following Corn

Comparison of Average Production Costs and Net Returns for Alternative Tillage Practices

Custom farmwork rates charged in Ontario (OMAF ISSN 0708–482X)	Conventional ($/hectare)	Reduced ($/hectare)	No–Till ($/hectare)
Cost of Conducting Operations:[1]			
Field Preparation	96.84	58.66	15.86
Planting	27.48	27.48	43.66
Growing	15.86	15.86	38.72
Harvesting	79.47	79.47	79.47
Subtotal	219.65	181.47	177.71
Material Costs (MA):[2]			
Seed	76.80	76.80	76.80
Fertilizer	137.00	137.00	137.00
Herbicide	69.59	69.59	72.76
Insecticide	42.93	42.93	42.93
Subtotal (MA)	326.32	326.32	329.49
TOTAL COST (TC)	545.97	507.79	507.20

Revenue (T–2000):			
Yield (t/ha) (from T–2000)[3] yield adj coef = 1.092	8.36	8.02	8.09
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	911.75	873.67	882.00
Margin:			
Operating Margin (TR – MA)	585.43	547.35	552.51
Net Revenue (TR – TC)	365.79	365.88	374.79
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	108.87	139.65	197.26

Revenue (Weersink):			
Yield (t/ha) (Weersink et al)[6] yld adj coef = 1.092	9.81	9.29	9.66
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	1068.87	1012.93	1053.40
Margin:			
Operating Margin (TR – MA)	742.55	686.61	723.91
Net Revenue (TR – TC)	522.90	505.14	546.19
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	155.63	192.80	287.47

Revenue (OMAF):			
Yield (t/ha) (from OMAF)[7]	7.14	7.14	7.14
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	778.26	778.26	778.26
Margin:			
Operating Margin (TR – MA)	451.94	451.94	448.77
Net Revenue (TR – TC)	232.29	270.47	271.06
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	69.13	103.23	142.66

SWEEP – Soil & Water Environmental Enhancement Program

PITTOCK – Corn following Other

Comparison of Average Production Costs and Net Returns for Alternative Tillage Practices

Custom farmwork rates charged in Ontario (OMAF ISSN 0708–482X)	Conventional ($/hectare)	Reduced ($/hectare)	No–Till ($/hectare)
Cost of Conducting Operations:[1]			
Field Preparation	96.84	58.66	15.86
Planting	27.48	27.48	43.66
Growing	29.87	29.87	38.72
Harvesting	79.47	79.47	79.47
Subtotal	233.66	195.48	177.71
Material Costs (MA):[2]			
Seed	76.80	76.80	76.80
Fertilizer	137.00	137.00	137.00
Herbicide	69.59	69.59	72.76
Insecticide	0.00	0.00	0.00
Subtotal (MA)	283.39	283.39	286.56
TOTAL COST (TC)	517.05	478.87	464.27

Revenue (T–2000):			
Yield (t/ha) (from T–2000)[3] yield adj coef = 1.092	8.36	8.02	8.09
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	911.75	873.67	882.00
Margin:			
Operating Margin (TR – MA)	628.36	590.28	595.44
Net Revenue (TR – TC)	394.71	394.79	417.72
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	117.47	150.69	219.85

Revenue (Weersink):			
Yield (t/ha) (Weersink et al)[6] yld adj coef = 1.092	9.81	9.29	9.66
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	1068.87	1012.93	1053.40
Margin:			
Operating Margin (TR – MA)	785.48	729.54	766.84
Net Revenue (TR – TC)	551.82	534.06	589.12
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	164.23	203.84	310.06

Revenue (OMAF):			
Yield (t/ha) (from OMAF)[7]	7.14	7.14	7.14
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	778.26	778.26	778.26
Margin:			
Operating Margin (TR – MA)	494.87	494.87	491.70
Net Revenue (TR – TC)	261.21	299.39	313.99
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	77.74	114.27	165.26

SWEEP – Soil & Water Environmental Enhancement Program

PITTOCK – Soybeans following Corn

Comparison of Average Production Costs and Net Returns for Alternative Tillage Practices

Custom farmwork rates charged in Ontario (OMAF ISSN 0708-482X)	Conventional ($/hectare)	Reduced ($/hectare)	No-Till ($/hectare)
Cost of Conducting Operations:[1]			
Field Preparation	113.59	73.81	31.73
Planting	27.33	27.33	47.20
Growing	29.87	29.87	15.86
Harvesting	80.63	80.63	80.63
Subtotal	251.42	211.64	175.42
Material Costs (MA):[2]			
Seed	60.93	60.93	60.93
Fertilizer	27.00	27.00	27.00
Herbicide	102.73	102.73	136.09
Insecticide	0.00	0.00	0.00
Subtotal (MA)	190.66	190.66	224.02
TOTAL COST (TC)	442.08	402.30	399.44
Revenue (T-2000):			
Yield (t/ha) (from T-2000)[3] yield adj coef = 1.055	2.84	2.63	2.34
Crop Price ($/t)[4]	231.33	231.33	231.33
TOTAL REVENUE (TR)	656.50	607.69	541.80
Margin:			
Operating Margin (TR - MA)	465.84	417.03	317.78
Net Revenue (TR - TC)	214.42	205.39	142.36
Total Hours (per hectare)[5]	2.99	2.82	2.03
Opportunity Cost of Labour ((TR-TC)/Hours = $/hour)	71.71	72.83	70.13
Revenue (Weersink):			
Yield (t/ha) (Weersink et al)[6] yld adj coef = 1.055	2.81	2.92	2.77
Crop Price ($/t)[4]	231.33	231.33	231.33
TOTAL REVENUE (TR)	649.18	676.03	641.86
Margin:			
Operating Margin (TR - MA)	458.52	485.37	417.84
Net Revenue (TR - TC)	207.10	273.73	242.42
Total Hours (per hectare)[5]	2.99	2.82	2.03
Opportunity Cost of Labour ((TR-TC)/Hours = $/hour)	69.26	97.07	119.42
Revenue (OMAF):			
Yield (t/ha) (from OMAF)[7]	2.57	2.57	2.57
Crop Price ($/t)[4]	231.33	231.33	231.33
TOTAL REVENUE (TR)	594.52	594.52	594.52
Margin:			
Operating Margin (TR - MA)	403.86	403.86	370.50
Net Revenue (TR - TC)	152.43	192.22	195.08
Total Hours (per hectare)[5]	2.99	2.82	2.03
Opportunity Cost of Labour ((TR-TC)/Hours = $/hour)	50.98	68.16	96.10

SWEEP – Soil & Water Environmental Enhancement Program

PITTOCK – Wheat following Soybeans

Comparison of Average Production Costs and Net Returns for Alternative Tillage Practices

Custom farmwork rates charged in Ontario (OMAF ISSN 0708–482X)	Conventional ($/hectare)	Reduced ($/hectare)	No–Till ($/hectare)
Cost of Conducting Operations:[1]			
Field Preparation	59.58	55.65	0.00
Planting	27.60	27.60	43.44
Growing	12.06	12.06	12.06
Harvesting	61.01	61.01	61.01
Subtotal	160.24	156.32	116.51
Material Costs (MA):[2]			
Seed	62.38	62.38	62.38
Fertilizer	64.06	64.06	64.06
Herbicide	0.00	0.00	0.00
Insecticide	0.00	0.00	0.00
Subtotal (MA)	126.44	126.44	126.44
TOTAL COST (TC)	286.68	282.76	242.95
Revenue (T–2000):			
Yield (t/ha) (from T–2000)[3] yield adj coef = 1.064	4.08	4.22	3.86
Crop Price ($/t)[4]	131.67	131.67	131.67
TOTAL REVENUE (TR)	536.57	556.18	508.55
Margin:			
Operating Margin (TR – MA)	410.13	429.74	382.11
Net Revenue (TR – TC)	249.89	273.43	265.60
Total Hours (per hectare)[5]	2.82	2.37	1.63
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	88.61	115.37	162.95
Revenue (OMAF):			
Yield (t/ha) (from OMAF)[7]	4.01	4.01	4.01
Crop Price ($/t)[4]	131.67	131.67	131.67
TOTAL REVENUE (TR)	528.00	528.00	528.00
Margin:			
Operating Margin (TR – MA)	401.56	401.56	401.56
Net Revenue (TR – TC)	241.31	245.24	285.05
Total Hours (per hectare)[5]	2.82	2.37	1.63
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	85.57	103.48	174.88

Essex

SWEEP – Soil & Water Environmental Enhancement Program

ESSEX – Corn following Other

Comparison of Average Production Costs and Net Returns for Alternative Tillage Practices

Custom farmwork rates charged in Ontario (OMAF ISSN 0708–482X)	Conventional ($/hectare)	Reduced ($/hectare)	No–Till ($/hectare)
Cost of Conducting Operations:[1]			
Field Preparation	85.87	68.92	15.44
Planting	26.46	26.46	42.43
Growing	38.75	38.75	37.07
Harvesting	74.67	74.67	74.67
Subtotal	225.75	208.80	169.61
Material Costs (MA):[2]			
Seed	71.38	71.38	71.38
Fertilizer	134.98	134.98	134.98
Herbicide	63.36	63.36	56.63
Insecticide	0.00	0.00	0.00
Subtotal (MA)	269.72	269.72	262.99
TOTAL COST (TC)	495.47	478.52	432.60

Revenue (T–2000):			
Yield (t/ha) (from T–2000)[3] yield adj coef = 1.065	8.16	7.82	7.89
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	889.21	852.06	860.19
Margin:			
Operating Margin (TR – MA)	619.49	582.34	597.20
Net Revenue (TR – TC)	393.74	373.54	427.59
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	117.18	142.57	225.05

Revenue (Weersink):			
Yield (t/ha) (Weersink et al)[6] yld adj coef = 1.065	9.56	9.06	9.43
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	1042.44	987.88	1027.35
Margin:			
Operating Margin (TR – MA)	772.72	718.16	764.36
Net Revenue (TR – TC)	546.97	509.36	594.75
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	162.79	194.41	313.03

Revenue (OMAF):			
Yield (t/ha) (from OMAF)[7]	6.97	6.97	6.97
Crop Price ($/t)[4]	109.00	109.00	109.00
TOTAL REVENUE (TR)	759.73	759.73	759.73
Margin:			
Operating Margin (TR – MA)	490.01	490.01	496.74
Net Revenue (TR – TC)	264.26	281.21	327.13
Total Hours (per hectare)[5]	3.36	2.62	1.90
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	78.65	107.33	172.17

SWEEP – Soil & Water Environmental Enhancement Program

ESSEX – Soybeans following Other

Comparison of Average Production Costs and Net Returns for Alternative Tillage Practices

Custom farmwork rates charged in Ontario (OMAF ISSN 0708–482X)	Conventional ($/hectare)	Reduced ($/hectare)	No–Till ($/hectare)
Cost of Conducting Operations:[1]			
Field Preparation	109.12	77.98	30.89
Planting	24.93	24.93	41.64
Growing	32.57	32.57	15.44
Harvesting	71.58	71.58	71.58
Subtotal	238.20	207.07	159.55
Material Costs (MA):[1]			
Seed	46.37	46.37	46.37
Fertilizer	0.00	0.00	0.00
Herbicide	150.30	150.30	183.66
Insecticide	0.00	0.00	0.00
Subtotal (MA)	196.67	196.67	230.03
TOTAL COST (TC)	434.87	403.74	389.58
Revenue (T–2000):			
Yield (t/ha) (from T–2000)[3] yield adj coef = 1.00	2.69	2.49	2.22
Crop Price ($/t)[4]	231.33	231.33	231.33
TOTAL REVENUE (TR)	622.28	576.01	513.55
Margin:			
Operating Margin (TR – MA)	425.61	379.34	283.52
Net Revenue (TR – TC)	187.40	172.27	123.97
Total Hours (per hectare)[5]	2.99	2.82	2.03
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	62.68	61.09	61.07
Revenue (Weersink):			
Yield (t/ha) (Weersink et al)[6] yld adj coef = 1.00	2.66	2.77	2.63
Crop Price ($/t)[4]	231.33	231.33	231.33
TOTAL REVENUE (TR)	615.34	640.78	608.40
Margin:			
Operating Margin (TR – MA)	418.67	444.11	378.37
Net Revenue (TR – TC)	180.46	237.04	218.82
Total Hours (per hectare)[5]	2.99	2.82	2.03
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	60.36	84.06	107.79
Revenue (OMAF):			
Yield (t/ha) (from OMAF)[7]	2.43	2.43	2.43
Crop Price ($/t)[4]	231.33	231.33	231.33
TOTAL REVENUE (TR)	562.13	562.13	562.13
Margin:			
Operating Margin (TR – MA)	365.46	365.46	332.10
Net Revenue (TR – TC)	127.26	158.39	172.55
Total Hours (per hectare)[5]	2.99	2.82	2.03
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	42.56	56.17	85.00

SWEEP – Soil & Water Environmental Enhancement Program

ESSEX – Wheat following Soybeans

Comparison of Average Production Costs and Net Returns for Alternative Tillage Practices

Custom farmwork rates charged in Ontario (OMAF ISSN 0708–482X)	Conventional ($/hectare)	Reduced ($/hectare)	No–Till ($/hectare)
Cost of Conducting Operations:[1]			
Field Preparation	55.87	32.62	11.93
Planting	22.73	22.73	41.71
Growing	11.93	11.93	11.93
Harvesting	67.53	67.53	67.53
Subtotal	158.07	134.82	133.11
Material Costs (MA):[2]			
Seed	68.10	68.10	68.10
Fertilizer	102.65	102.65	102.65
Herbicide	0.00	0.00	0.00
Insecticide	0.00	0.00	0.00
Subtotal (MA)	170.75	170.75	170.75
TOTAL COST (TC)	328.82	305.57	303.86
Revenue (T–2000):			
Yield (t/ha) (from T–2000)[3] yield adj coef = 1.011	3.87	4.01	3.67
Crop Price ($/t)[4]	131.67	131.67	131.67
TOTAL REVENUE (TR)	509.84	528.48	483.22
Margin:			
Operating Margin (TR – MA)	339.09	357.73	312.47
Net Revenue (TR – TC)	181.02	222.91	179.36
Total Hours (per hectare)[5]	2.82	2.37	1.63
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	64.19	94.06	110.03
Revenue (OMAF):			
Yield (t/ha) (from OMAF)[3]	3.81	3.81	3.81
Crop Price ($/t)[4]	131.67	131.67	131.67
TOTAL REVENUE (TR)	501.66	501.66	501.66
Margin:			
Operating Margin (TR – MA)	330.91	330.91	330.91
Net Revenue (TR – TC)	172.84	196.09	197.80
Total Hours (per hectare)[5]	2.82	2.37	1.63
Opportunity Cost of Labour ((TR–TC)/Hours = $/hour)	61.29	82.74	121.35

APPENDIX B

COST OF OPERATIONS AND MATERIALS

TABLE B–1 KETTLE CREEK CORN FOLLOWING CORN

TYPICAL OPERATIONS

OPERATIONS	Conventional $/ha	Reduced $/ha	No–Till $/ha
FIELD PREPARATION			
Spray (roundup)			15.44
Moldboard plow	40.20		
Chisel plow		32.32	
Cultivate	20.68	20.68	
Cultivate	20.68	20.68	
Subtotal	81.57	73.69	15.44
PLANTING			
No–till planter (w/fertilizer & insecticide)			42.43
Plant (w/fertilizer & insecticide)	26.46	26.46	
Subtotal	26.46	26.46	42.43
GROWING			
Spray (banvel & atrazine)	15.44	15.44	15.44
Fertilize (liquid N)	21.62	21.62	21.62
Row cultivate	17.12	17.12	
Subtotal	54.19	54.19	37.07
HARVESTING			
Combine	74.67	74.67	74.67
Subtotal	74.67	74.67	74.67

TYPICAL MATERIALS

INPUTS	Conventional $/ha	Reduced $/ha	No–Till $/ha
SEED			
Pioneer 3790 (0.865 bu/ha @ $88.80/bu)	76.80	76.80	76.80
Subtotal	76.80	76.80	76.80
FERTILIZER			
Dry 7–38–15 (135 kg/ha @ $296.29/t)	40.00	40.00	40.00
Liquid N 28–0–0 (448 L/ha @ $0.23/L)	103.40	103.40	103.40
Subtotal	143.40	143.40	143.40
HERBICIDE			
Roundup (2.47 L/ha @ $13.50/L)			33.36
Banvel (1.24 L/ha @ $26.90/L)	33.24	33.24	33.24
Dry Atrazine (1.1 kg/ha @ $5.60/kg)	6.16	6.16	6.16
Subtotal	39.40	39.40	72.76
INSECTICIDE			
Gran Dyfonate (9 kg/ha @ $4.60/kg)	41.40	41.40	41.40
Subtotal	41.40	41.40	41.40

TABLE B–2 KETTLE CREEK CORN FOLLOWING OTHER

TYPICAL OPERATIONS

OPERATIONS	Conventional $/ha	Reduced $/ha	No–Till $/ha
FIELD PREPARATION			
Spray (roundup)			15.44
Moldboard plow	40.20		
Chisel plow		32.32	
Cultivate	20.68	20.68	
Incorporate (atrazine & dual)	24.98	24.98	
Subtotal	85.87	77.98	15.44
PLANTING			
No–till planter (w/fertilizer)			42.43
Plant (w/fertilizer)	26.46	26.46	
Subtotal	26.46	26.46	42.43
GROWING			
Spray (pardner & atrazine)			15.44
Spray (pardner)	15.44	15.44	
Fertilize (liquid N)	21.62	21.62	21.62
Row cultivate	17.12	17.12	
Subtotal	54.19	54.19	37.07
HARVESTING			
Combine	74.67	74.67	74.67
Subtotal	74.67	74.67	74.67

TYPICAL MATERIALS

INPUTS	Conventional $/ha	Reduced $/ha	No–Till $/ha
SEED			
Pioneer 3790 (0.865 bu/ha @ $88.80/bu)	76.80	76.80	76.80
Subtotal	76.80	76.80	76.80
FERTILIZER			
Dry 6–24–24 (168 kg/ha @ $235/t)	39.98	39.98	39.98
Liquid N 28–0–0 (448 L/ha @ $0.23/L)	103.40	103.40	103.40
Subtotal	143.38	143.38	143.38
HERBICIDE			
Roundup (2.47 L/ha @ $13.50/L)			33.36
Pardner (1.24 L/ha @ $13.80/L)	17.11	17.11	17.11
Dry Atrazine (1.1 kg/ha @ $5.60/kg)			6.16
Liquid Atrazine (1.24 L/ha @ $3.70/L)	4.57	4.57	
Dual (1.98 L/ha @ $20.10/L)	39.73	39.73	
Subtotal	61.41	61.41	56.63
INSECTICIDE			
Subtotal	0.00	0.00	0.00

TABLE B–3 KETTLE CREEK SOY FOLLOWING CORN

TYPICAL OPERATIONS

OPERATIONS	Conventional $/ha	Reduced $/ha	No–Till $/ha
FIELD PREPARATION			
Spray (roundup)			15.44
Moldboard plow	40.20		
Chisel plow		32.32	
Cultivate	20.68	20.68	
Incorporate (dual)	24.98	24.98	
Subtotal	85.87	77.98	15.44
PLANTING			
No–till planter			41.64
Plant	24.93	24.93	
Subtotal	24.93	24.93	41.64
GROWING			
Spray (dual & lorox)			15.44
Spray (basagran & assist)	15.44	15.44	
Row cultivate	17.12	17.12	
Subtotal	32.57	32.57	15.44
HARVESTING			
Combine	71.58	71.58	71.58
Subtotal	71.58	71.58	71.58

TYPICAL MATERIALS

INPUTS	Conventional $/ha	Reduced $/ha	No–Till $/ha
SEED			
Soy KG 60 (100.8 kg/ha @ $0.64/kg)	64.51	64.51	64.51
Subtotal	64.51	64.51	64.51
FERTILIZER			
Subtotal	0.00	0.00	0.00
HERBICIDE			
Roundup (2.47 L/ha @ $13.50/L)			33.36
Dual (2.47 L/ha @ $20.10/L)	49.65	49.65	49.65
Lorox (1.98 L/ha @ $18.40/L)			36.43
Basagran (2.22 L/ha @ $22/L)	48.93	48.93	
Assist (1.98 L/ha @ $2.10/L)	4.15	4.15	
Subtotal	102.73	102.73	119.44
INSECTICIDE			
Subtotal	0.00	0.00	0.00

TABLE B–4 KETTLE CREEK WHEAT FOLLOWING SOY

TYPICAL OPERATIONS

OPERATIONS	Conventional $/ha	Reduced $/ha	No–Till $/ha
FIELD PREPARATION			
Cultivate	20.68		
Cultivate	20.68	20.68	
Subtotal	41.36	20.68	0.00
PLANTING			
No–till drill			41.71
Plant	22.73	22.73	
Subtotal	22.73	22.73	41.71
GROWING			
Fertilize (w/clover)	11.93	11.93	11.93
Subtotal	11.93	11.93	11.93
HARVESTING			
Combine	67.53	67.53	67.53
Subtotal	67.53	67.53	67.53

TYPICAL MATERIALS

INPUTS	Conventional $/ha	Reduced $/ha	No–Till $/ha
SEED			
Harus (123.2 kg/ha @ $0.29/kg)	35.73	35.73	35.73
Clover (10.1 kg/ha @ $2.60/kg)	26.26	26.26	26.26
Subtotal	61.99	61.99	61.99
FERTILIZER			
Dry Urea 46–0–0 (224 kg/ha @ $290/t)	64.96	64.96	64.96
Subtotal	64.96	64.96	64.96
HERBICIDE			
Subtotal	0.00	0.00	0.00
INSECTICIDE			
Subtotal	0.00	0.00	0.00

TABLE B–5 PITTOCK CORN FOLLOWING CORN

TYPICAL OPERATIONS

OPERATIONS	Conventional $/ha	Reduced $/ha	No–Till $/ha
FIELD PREPARATION			
Spray (roundup)			15.86
Moldboard plow	38.18		
Cultivate	21.40	21.40	
Spray/Fertilize (dual, liquid N)	15.86	15.86	
Cultivate	21.40	21.40	
Subtotal	96.84	58.66	15.86
PLANTING			
No–till planter (w/fertilizer & insecticide)			43.66
Plant (w/fertilizer & insecticide)	27.48	27.48	
Subtotal	27.48	27.48	43.66
GROWING			
Spray (banvel & atrazine)			15.86
Fertilize (liquid N)			22.86
Spray (banvel)	15.86	15.86	
Subtotal	15.86	15.86	38.72
HARVESTING			
Combine	79.47	79.47	79.47
Subtotal	79.47	79.47	79.47

TYPICAL MATERIALS

INPUTS	Conventional $/ha	Reduced $/ha	No–Till $/ha
SEED			
Pioneer 3790 (0.865 bu/ha @ $88.80/bu)	76.80	76.80	76.80
Subtotal	76.80	76.80	76.80
FERTILIZER			
Liquid N 28–0–0 (448 L/ha @ $0.23/L)	103.40	103.40	103.40
Liquid 6–24–6 (56 L/ha @ $0.60/L)	33.60	33.60	33.60
Subtotal	137.00	137.00	137.00
HERBICIDE			
Roundup (2.47 L/ha @ $13.50/L)			33.36
Banvel (1.24 L/ha @ $26.90/L)			33.24
Dry Atrazine (1.1 kg/ha @ $5.60/kg)			6.16
Dual (2.47 L/ha @ $20.10/L)	49.65	49.65	
Banvel (0.74 L/ha @ $26.90/L)	19.94	19.94	
Subtotal	69.59	69.59	72.76
INSECTICIDE			
Dry Counter (10.1 kg/ha @ $4.25/kg)	42.93	42.93	42.93
Subtotal	42.93	42.93	42.93

TABLE B–6 PITTOCK CORN FOLLOWING OTHER

TYPICAL OPERATIONS

OPERATIONS	Conventional $/ha	Reduced $/ha	No–Till $/ha
FIELD PREPARATION			
Spray (roundup)			15.86
Moldboard plow	38.18		
Cultivate	21.40	21.40	
Spray/Fertilize (dual, liquid N)	15.86	15.86	
Cultivate	21.40	21.40	
Subtotal	96.84	58.66	15.86
PLANTING			
No–till planter (w/fertilizer)			43.66
Plant (w/fertilizer)	27.48	27.48	
Subtotal	27.48	27.48	43.66
GROWING			
Spray (banvel & atrazine)			15.86
Fertilize (liquid N)			22.86
Spray (banvel)	15.86	15.86	
Row cultivate	14.01	14.01	
Subtotal	29.87	29.87	38.72
HARVESTING			
Combine	79.47	79.47	79.47
Subtotal	79.47	79.47	79.47

TYPICAL MATERIALS

INPUTS	Conventional $/ha	Reduced $/ha	No–Till $/ha
SEED			
Pioneer 3790 (0.865 bu/ha @ $88.80/bu)	76.80	76.80	76.80
Subtotal	76.80	76.80	76.80
FERTILIZER			
Liquid N 28–0–0 (448 L/ha @ $0.23/L)	103.40	103.40	103.40
Liquid 6–24–6 (56 L/ha @ $0.60/L)	33.60	33.60	33.60
Subtotal	137.00	137.00	137.00
HERBICIDE			
Roundup (2.47 L/ha @ $13.50/L)			33.36
Banvel (1.24 L/ha @ $26.90/L)			33.24
Dry Atrazine (1.1 kg/ha @ $5.60/kg)			6.16
Dual (2.47 L/ha @ $20.10/L)	49.65	49.65	
Banvel (0.74 L/ha @ $26.90/L)	19.94	19.94	
Subtotal	69.59	69.59	72.76
INSECTICIDE			
Subtotal	0.00	0.00	0.00

TABLE B–7 PITTOCK SOY FOLLOWING CORN

TYPICAL OPERATIONS

OPERATIONS	Conventional $/ha	Reduced $/ha	No–Till $/ha
FIELD PREPARATION			
Spray (roundup)			15.86
Spray (dual)			15.86
Moldboard plow	38.18		
Disc	23.01	23.01	
Cultivate	21.40	21.40	
Incorporate (dual)	31.01	31.01	
Subtotal	113.60	75.42	31.72
PLANTING			
No–till planter (w/fertilizer)			47.20
Plant (w/fertilizer)	27.33	27.33	
Subtotal	27.33	27.33	47.20
GROWING			
Spray (basagran & assist)	15.86	15.86	15.86
Row cultivate	14.01	14.01	
Subtotal	29.87	29.87	15.86
HARVESTING			
Combine	80.63	80.63	80.63
Subtotal	80.63	80.63	80.63

TYPICAL MATERIALS

INPUTS	Conventional $/ha	Reduced $/ha	No–Till $/ha
SEED			
Soy KG 60 (95.2 kg/ha @ $0.64/kg)	60.93	60.93	60.93
Subtotal	60.93	60.93	60.93
FERTILIZER			
Liquid 6–24–6 (45 L/ha @ $0.60/L)	27.00	27.00	27.00
Subtotal	27.00	27.00	27.00
HERBICIDE			
Roundup (2.47 L/ha @ $13.50/L)			33.36
Dual (2.47 L/ha @ $20.10/L)	49.65	49.65	49.65
Basagran (2.22 L/ha @ $22/L)	48.93	48.93	48.93
Assist (1.98 L/ha @ $2.10/L)	4.15	4.15	4.15
Subtotal	102.73	102.73	136.09
INSECTICIDE			
Subtotal	0.00	0.00	0.00

TABLE B–8 PITTOCK WHEAT FOLLOWING SOY

TYPICAL OPERATIONS

OPERATIONS	Conventional $/ha	Reduced $/ha	No–Till $/ha
FIELD PREPARATION			
Moldboard plow	38.18		
Chisel plow		34.25	
Cultivate	21.40	21.40	
Subtotal	59.58	55.65	0.00
PLANTING			
No–till drill (w/fertilizer)			43.44
Plant (w/fertilizer)	27.60	27.60	
Subtotal	27.60	27.60	43.44
GROWING			
Fertilize (w/clover)	12.06	12.06	12.06
Subtotal	12.06	12.06	12.06
HARVESTING			
Combine	61.01	61.01	61.01
Subtotal	61.01	61.01	61.01

TYPICAL MATERIALS

INPUTS	Conventional $/ha	Reduced $/ha	No–Till $/ha
SEED			
Harus (134.4 kg/ha @ $0.29/kg)	38.98	38.98	38.98
Clover (9 kg/ha @ $2.60/kg)	23.40	23.40	23.40
Subtotal	62.38	62.38	62.38
FERTILIZER			
Dry 6–24–24 (134.4 kg/ha @ $235/t)	31.58	31.58	31.58
Dry Urea 46–0–0 (112 kg/ha @ $290/t)	32.48	32.48	32.48
Subtotal	64.06	64.06	64.06
HERBICIDE			
Subtotal	0.00	0.00	0.00
INSECTICIDE			
Subtotal	0.00	0.00	0.00

TABLE B–9 ESSEX CORN FOLLOWING OTHER

TYPICAL OPERATIONS

OPERATIONS	Conventional $/ha	Reduced $/ha	No–Till $/ha
FIELD PREPARATION			
Spray (roundup)			15.44
Moldboard plow	40.20		
Disc		23.25	
Cultivate	20.68	20.68	
Incorporate (atrazine & dual)	24.98	24.98	
Subtotal	85.87	68.91	15.44
PLANTING			
No–till planter (w/fertilizer)			42.43
Plant (w/fertilizer)	26.46	26.46	
Subtotal	26.46	26.46	42.43
GROWING			
Spray (pardner & atrazine)			15.44
Fertilize (liquid N)	21.62	21.62	21.62
Row cultivate	17.12	17.12	
Subtotal	38.75	38.75	37.07
HARVESTING			
Combine	74.67	74.67	74.67
Subtotal	74.67	74.67	74.67

TYPICAL MATERIALS

INPUTS	Conventional $/ha	Reduced $/ha	No–Till $/ha
SEED			
Pioneer 3737 (0.803 bu/ha @ $88.88/bu)	71.38	71.38	71.38
Subtotal	71.38	71.38	71.38
FERTILIZER			
Dry 6–24–24 (134.4 kg/ha @ $235/t)	31.58	31.58	31.58
Liquid N 28–0–0 (448 L/ha @ $0.23/L)	103.40	103.40	103.40
Subtotal	134.98	134.98	134.98
HERBICIDE			
Roundup (2.47 L/ha @ $13.50/L)			33.36
Pardner (1.24 L/ha @ $13.80/L)			17.11
Dry Atrazine (1.1 kg/ha @ $5.60/kg)			6.16
Dual (2.47 L/ha @ $20.10/L)	49.65	49.65	
Liquid Atrazine (3.71 L/ha @ $3.70/L)	13.71	13.71	
Subtotal	63.36	63.36	56.63
INSECTICIDE			
Subtotal	0.00	0.00	0.00

TABLE B–10 ESSEX SOY FOLLOWING OTHER

TYPICAL OPERATIONS

OPERATIONS	Conventional $/ha	Reduced $/ha	No–Till $/ha
FIELD PREPARATION			
Spray (roundup)			15.44
Spray (dual & sencor)			15.44
Moldboard plow	40.20		
Chisel plow		32.32	
Disc	23.25		
Cultivate	20.68	20.68	
Incorporate (dual & sencor)	24.98	24.98	
Subtotal	109.12	77.98	30.89
PLANTING			
No–till planter			41.64
Plant	24.93	24.93	
Subtotal	24.93	24.93	41.64
GROWING			
Spray (basagran & assist)	15.44	15.44	15.44
Row cultivate	17.12	17.12	
Subtotal	32.57	32.57	15.44
HARVESTING			
Combine	71.58	71.58	71.58
Subtotal	71.58	71.58	71.58

TYPICAL MATERIALS

INPUTS	Conventional $/ha	Reduced $/ha	No–Till $/ha
SEED			
Elgin 87 (100.8 kg/ha @ $0.46/kg)	46.37	46.37	46.37
Subtotal	46.37	46.37	46.37
FERTILIZER			
Subtotal	0.00	0.00	0.00
HERBICIDE			
Roundup (2.47 L/ha @ $13.50/L)			33.36
Dual (2.47 L/ha @ $20.10/L)	49.65	49.65	49.65
Sencor (1.24 L/ha @ $38.50/L)	47.57	47.57	47.57
Basagran (2.22 L/ha @ $22/L)	48.93	48.93	48.93
Assist (1.98 L/ha @ $2.10/L)	4.15	4.15	4.15
Subtotal	150.30	150.30	183.66
INSECTICIDE			
Subtotal	0.00	0.00	0.00

TABLE B–11 ESSEX WHEAT FOLLOWING SOY

TYPICAL OPERATIONS

OPERATIONS	Conventional $/ha	Reduced $/ha	No–Till $/ha
FIELD PREPARATION			
Disc	23.25		
Fertilize	11.93	11.93	11.93
Cultivate	20.68	20.68	
Subtotal	55.86	32.61	11.93
PLANTING			
No–till drill			41.71
Plant	22.73	22.73	
Subtotal	22.73	22.73	41.71
GROWING			
Fertilize (w/clover)	11.93	11.93	11.93
Subtotal	11.93	11.93	11.93
HARVESTING			
Combine	67.53	67.53	67.53
Subtotal	67.53	67.53	67.53

TYPICAL MATERIALS

INPUTS	Conventional $/ha	Reduced $/ha	No–Till $/ha
SEED			
Harus (134.4 kg/ha @ $0.29/kg)	38.98	38.98	38.98
Clover (11.2 kg/ha @ $2.60/kg)	29.12	29.12	29.12
Subtotal	68.10	68.10	68.10
FERTILIZER			
Gran 8–32–16 (224 kg/ha @ $282/t)	63.17	63.17	63.17
Dry Am Nit 34–0–0 (168 kg/ha @ $235/t)	39.48	39.48	39.48
Subtotal	102.65	102.65	102.65
HERBICIDE			
Subtotal	0.00	0.00	0.00
INSECTICIDE			
Subtotal	0.00	0.00	0.00